

REMARKS

Claims 1, 2, 5, 6, 9, 10, 20, 21, 24, 25, 28, 29, 32, 33, 36, and 37 are pending, with claims 1 and 2 being independent. Claim 1 has been amended and claims 36 and 37 have been added. Support for the amendment to claim 1 can be found in the originally-filed specification, at least at page 8, line 1 to page 11, line 24 and Figs. 1A-2D, and support for the new claims can be found in the originally-filed specification, at least at page 5, line 25 to page 6, line 28 and page 9, lines 5-22. No new matter has been introduced.

Applicant thanks the Examiner for the personal interview granted on November 18, 2008. During that interview, claims 1 and 2 were discussed in view of U.S. Patent No. 4,646,424 (Parks), U.S. Patent No. 6,009,888 (Ye), and U.S. Patent No. 5,252,427 (Bauer). Applicant presented amendments to the Examiner that are substantially identical to those being submitted with this reply. The remarks below reflect the arguments of applicant that were presented during the personal interview.

Claims 1, 2, 9, 10, 20, 21, 24, 25, 32, and 33 have been rejected as being unpatentable over Parks in view of Ye and Bauer.

Applicant requests withdrawal of the rejection of claims 1, 9, 20, 24, and 32 because neither Parks, Ye, Bauer, nor any proper combination of the three describes or suggests, after irradiating a resist pattern on an entire surface of a substrate, applying a resist stripper which dissolves and removes the resist pattern, where the resist pattern was formed by exposing a resist film and developing the resist film, as recited in independent claim 1.

In Parks, a gate electrode pattern 14 is formed by first applying a positive photoresist to a substrate that was previously coated with a layer of titanium, then exposing and developing the photoresist to form a pattern mask, and plasma etching the substrate to remove the titanium beneath the exposed resist pattern. See Parks at col. 6, lines 3-44. Next, the substrate is plasma ashed to remove the remaining photoresist material and then the remaining resist material is subsequently stripped from the substrate to form the structure shown in Fig. 4A. See Parks at col. 6, lines 44-59.

However, the exposure step described in Parks in these passage is applied to the photoresist as part of forming the resist pattern. After the exposure step, Parks develops the resist to form the resist pattern. Thus, since the resist pattern does not yet exist when Parks performs the exposure step, Parks cannot be said to irradiate the resist pattern. Additionally, Parks also fails to apply a resist stripper on the entire surface of the substrate after irradiating the resist pattern. In Parks, the resist pattern is removed by an ashing method, and not by using a resist stripper. As Parks explains at col. 6, lines 58-60 “a remaining resist material is stripped from the substrate.” There is nothing in this passage that suggests that a resist stripper is used to dissolve and remove the resist pattern.

Ye does not remedy the deficiencies of Parks to describe or suggest this subject matter. In Ye, a photoresist pattern 28 and polymer layer 30 are immersed in a wet bath 34 and then irradiated with UV light. See Ye at col. 5, lines 43-47 and Figs. 3 and 7. As Ye explains, the “oxidizing bath 34 and UV layer ablates the PR pattern 28 and the polymer 30.” See Ye at col. 5, lines 47-49 and Figs. 3 and 7. Thus, Ye’s removal of the photoresist pattern 28 is not performed after irradiation of Ye’s photoresist pattern 28 on the entire surface of the wafer 10 to react photosensitizer in the resist pattern to the UV light. Rather, the removal of Ye’s photoresist pattern 28 and irradiation are performed concurrently with each other in a UV ablation step. See Ye at col. 5, lines 43-49 and Fig. 3.

Bauer also does not remedy the deficiencies of Parks to describe or suggest this subject matter. Bauer describes that a photoresist pattern is formed by performing a first exposure and a first development to a photoresist layer that is applied to a substrate that is a copper-clad fiberglass epoxy board. See Bauer at col. 6, lines 39-50. Next, the surface areas of the substrate that were uncovered by the development are modified in one of two different “instances.” In the first instance, the uncovered copper surface areas are removed by etching by a “stripping process involving re-exposure to actinic radiation followed by a second development operation to form the circuit board directly.” See Bauer at col. 6, lines 54-56 and 58-63. In the second instance, the unexposed resist is “first removed from the unplated copper surface which is then etched or removed from the substrate to form a plated printed circuit board.” See Bauer at col. 6, lines 64-

66. Bauer explains that in both instances a “second overall exposure is used to solubilize the remaining unexposed resists for removal under normal development conditions” or “the resists ... may be directly removed or stripped without a second overall exposure by treatment with alkaline stripping solution.” See Bauer at col. 6, line 66 to col. 7, line 4. As applicant discussed with the Examiner during the interview of November 18, 2008, it is believed that this passage merely describes the two alternative ways of etching that can be performed in either of the two instances. Thus, in the first instance, the photoresist can be removed either with a second exposure under normal development conditions or using a treatment with a stripping solution. And, in the second instance, the unplated copper surface can be removed either with a second exposure under normal development conditions or using a treatment with a stripping solution.

However, in either instance detailed in Bauer, Bauer fails to describe or suggest an irradiation of a resist pattern followed by an application of a resist stripper, where the resist pattern was previously formed by exposing a resist film and developing the resist film. Instead, in Bauer, if an irradiation of a resist pattern occurs after the resist pattern was previously formed by exposure and development, then there is no application of a stripping solution, and if a stripping solution is used as a treatment after the resist pattern was previously formed by exposure and development, then there is no irradiation of a resist pattern prior to the use of the stripping solution and after the resist pattern was previously formed by exposure and development.

Accordingly, for at least these reasons, claim 1 is allowable over any proper combination of Parks, Ye, and Bauer, as are dependent claims 9, 20, 24, and 32.

Applicant requests withdrawal of the rejection of claims 2, 10, 21, 25, and 33 because neither Parks, Ye, Bauer, nor any proper combination of the three describes or suggests removing a residue of a resist pattern by using a developer that is used in developing a resist film to form the resist pattern after etching, as recited in independent claim 2.

There is nothing in Parks that suggests that the resist pattern is removed using a “developer” that is used in developing to form the resist pattern. Rather, as discussed above, Parks explains that the photoresist material is removed using a plasma ashing method in an

oxygen atmosphere. See Parks at col. 6, lines 44-47. Additionally, Parks never describes or suggests that the photoresist material is removed after a resist pattern residue is irradiated, since Parks does not describe irradiation of a resist pattern residue with a light.

Moreover, while Ye mentions that a UV laser in combination with an acid bath is used to remove the photoresist pattern 28, Ye fails to describe or suggest that the photoresist pattern and the residue of the resist pattern are removed using a developer after the UV laser irradiates a residue of the photoresist pattern 28.

In Bauer, in the first instance, the unexposed resist is removed by either re-exposure plus a second development operation or by using a stripping treatment. See Bauer at col. 6, line 58 to col. 7, line 4. Bauer does not describe any subsequent steps for dealing with a resist residue after the removal of the unexposed resist in the first instance. In Bauer's second instance, the unexposed resist is first removed from the unplated copper surface using a second overall exposure or using a stripping treatment, and the copper surface is then etched. See Bauer at col. 6, line 63 to col. 7, line 4.

Accordingly, claim 2 is allowable over any proper combination of Parks, Ye, and Bauer, as are dependent claims 10, 21, 25, and 33.

Claims 5 and 6 have been rejected as being unpatentable over Parks, Ye, Bauer, and U.S. Patent No. 6,645,851 (Ho). Claims 5 and 6 depend, respectively, from claims 1 and 2 and are allowable for at least the reasons that claims 1 and 2 are allowable. In particular, Ho, which was not relied upon to show these features, fails to describe or suggest the features of claims 1 and 2 that, as discussed above, are not described or suggested by Parks, Ye and Bauer. Accordingly, independent claims 1 and 2 are allowable over any proper combination of Parks, Ye, Bauer, and Ho, as are dependent claims 5 and 6.

Claims 28 and 29 have been rejected as being unpatentable over Parks, Ye, Bauer, and U.S. Patent No. 4,673,808 (Katohno). Claims 28 and 29 depend, respectively, from claims 1 and 2 and are allowable for at least the reasons that claims 1 and 2 are allowable. Katohno, which was not relied upon to show these features, fails to describe or suggest the features of claims 1 and 2 that, as discussed above, are not described or suggested by Parks, Ye and Bauer.

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Accordingly, independent claims 1 and 2 are allowable over any proper combination of Parks, Ye, Bauer, and Katohno, as are dependent claims 28 and 29.

New claims 36 and 37 each recite that exposing the resist film includes irradiating the resist film with light having the photosensitive wavelength region of the photosensitizer.

Applicant requests consideration and allowance of claims 36 and 37, which are believed to be allowable for at least the reasons that their respective independent claims are allowable.

In conclusion, applicant submits that all claims are in condition for allowance. It is believed that no fee is due in connection with this filing. Nevertheless, please apply any charges or credits to deposit account 06-1050.

Respectfully submitted,

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